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INDUCED LABOR IN A UNIVERSITY HOSPITAL: METHODS AND OUTCOMES

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ABSTRACT

Objective: to identify the indications, practices and outcomes of labor induction, in a University Hospital of Southern Brazil.

Method: a cross-sectional study. The target population of this study were 137 women who were hospitalized for labor induction from January to October 2014. Data analysis was performed through simple, exploratory statistical analysis and non-parametric test, adopting a significance level of $p \leq 0.05$.

Results: most (53%) of the inductions were performed due to post-term pregnancy. As for the methods of induction, the use of Misoprostol of 25mcg administered via the vaginal route was found in 46% of cases and the use of Misoprostol in combination with Oxytocin was found in 28.4% of cases. Misoprostol was more associated with vaginal delivery.

Conclusion: Induction, if used correctly, is an important strategy for the reduction of high cesarean rates.

DESCRIPTORS: Induced labor. Labor. Oxytocin. Misoprostol.

INDUÇÃO DE PARTO EM UM HOSPITAL UNIVERSITÁRIO: MÉTODOS E DESFECHOS

RESUMO

Objetivo: identificar as indicações de indução de trabalho de parto, as práticas utilizadas e os seus desfechos, em um Hospital Universitário do Sul do Brasil.

Método: estudo transversal. A população-alvo deste estudo forem 137 mulheres que foram internadas para a indução de trabalho de parto no período de janeiro a outubro de 2014. A análise dos dados foi realizada por meio de análise estatística simples, exploratória, e teste não paramétrico, adotando nível de significância de $p \leq 0,05$.

Resultados: a maioria (53%) das induções foi realizada por pós-datismo. Quanto aos métodos, destacou-se o uso do Misoprostol de 25mcg via vaginal em 46%, e também o uso do Misoprostol associado à Ocitocina em 28,4%. O Misoprostol foi mais associado a parto vaginal.

Conclusão: a indução, caso seja utilizada da maneira correta, é uma importante estratégia para a redução dos altos índices de cesarianas.

DESCRITORES: Trabalho de parto induzido. Trabalho de parto. Ocitocina. Misoprostol.

INDUCCIÓN DEL PARTO EN UN HOSPITAL UNIVERSITARIO: MÉTODOS Y RESULTADOS

RESUMEN

Objetivo: identificar las indicaciones de inducción de trabajo de parto, las prácticas utilizadas y sus resultados, en un Hospital Universitario del Sur de Brasil.

Método: Estudio transversal. La población meta de este estudio fue de 137 mujeres que ingresaron para la inducción de trabajo de parto en el período de enero a octubre de 2014. El análisis de los datos fue realizado por medio de análisis estadístico simple, exploratorio, y prueba no paramétrica, adoptando nivel de significancia de p≤0,05.

Resultados: la mayoría (53%) de las inducciones fue realizada por post-datismo. En cuanto a los métodos, se destacó el uso del Misoprostol de 25 mcg vía vaginal en un 46%, y también el uso del Misoprostol asociado a Oxitocina en un 28,4%. El Misoprostol fue más asociado al parto vaginal.

Conclusión: la inducción, si se utiliza de la manera correcta, es una importante estrategia para la reducción de los altos índices de cesáreas.

DESCRIPTORES: Trabajo de parto inducido. Trabajo de parto. Oxitocina. Misoprostol.

INTRODUCTION

In a context of humanization of labor and childbirth, respect for women's rights and desires, and evidence-based obstetric practices, labor induction is an accepted and recommended procedure whenever there is an indication. If well indicated, the induction will avoid, in the Brazilian reality, an unnecessary cesarean section.[1-3]

Labor induction consists in artificially stimulating the uterine contractions before their spontaneous onset, leading to the onset of labor. This practice is recommended for women from the 22nd week of gestation with the objective of promoting vaginal delivery when the continuation of pregnancy means greater maternal-fetal risk than interruption.[2] Induction practice should be differentiated from so-called conduction during labor, for the purpose of accelerating the labor, at which time several methods can be used simultaneously.[3] Although labor induction has been used for over 400 years, natural methods which were used in the past, such as castor oil, were ineffective. In the last ten years, the knowledge of new methods and the possibility of diagnoses of fetal complications that are more precise and early have led to a dizzying increase in induced births. Indications for labor induction may be classified as elective or therapeutic. Those that are motivated by the convenience of the doctor and/or the pregnant woman are elective. As these "social indications" are not based on evidence or guidelines, maternal and neonatal risks are increased. The therapeutic indications are due to the higher risk to the fetus due to the permanence in the uterus, which may occur due to fetal attachments, such as premature rupture of ovary membranes or ovular infection; to the fetus itself (macrosomia, restricted intrauterine growth); Maternal clinical intercurrences (e.g., Hypertensive Gestational Syndromes and types of Diabetes); and gestational age (prolonged pregnancy).[5-6]

Presently, there are several alternatives methods and medications for cervical preparation and labor induction. Methods of labor induction may be classified as mechanical or pharmacological. Mechanical methods involve the use of maneuvers and devices for induction, including transcervical catheters, hygroscopic cervical dilators, extra-amniotic saline infusion, membrane detachment, and amniotomy.[6]

Pharmacological methods include the use of substances that act on the uterus. The effect on the uterine cervix is manifested by the alteration of the elements that compose Bishop's Index (which evaluates the maturation of the cervix), and the uterine body, by the triggering of uterine contractions. Oxytocin and Prostaglandins are currently used for this purpose, especially Misoprostol (Prostaglandin E1).[6]

Although there are different methods and indications for labor induction, scientific literature is still limited and lacks a definite consensus. The choice of method or dose of the medicine, route and administration still vary greatly. It is therefore important to have clear knowledge of maternal and neonatal outcomes and it should be indicated in appropriate clinical and/or obstetric situations to prevent negative outcomes.

Therefore, in order to know the methods and outcomes used in local obstetric practice, and aim to improve the assistance to women throughout the labor process, the need to carry out this research was confirmed whose objective is to identify the indications of labor induction, the practices used and their outcomes in a university hospital in the South of Brazil.

METHODOLOGY

This is a cross-sectional, quantitative study. The target population were women hospitalized for labor induction in an Obstetric Center (OC) of a university hospital in southern Brazil from January to October 2014.

Pregnant women with a minimum age of 18 years, hospitalized with a live fetus, with gestation above 22 weeks and a medical indication for labor induction were included in the study. Parturient women who came to maternity in active labor and/or hospitalized for inhibition of labor and those with an elective cesarean section were excluded.

The sample calculation was performed through the total number of inductions, which occurred from January to October 2014. This data was obtained through the admissions register of the unit in question. It was estimated that out of the 1,394 hospitalizations that occurred in the chosen period, 15% represented the labor inductions. Therefore, this study considered 209 women who underwent labor induction. Thus, the sample was calculated, with a confidence interval of 95%, with no sample loss, resulting in a sample of 137 women.

Data collection was carried out in the Patient Record Service sector, which is located on the hospital's premises, from June to September 2015. Data were collected through a form that included sociodemographic variables, obstetric history, current obstetric data and outcome of current gestation.

Sampling was probabilistic of the simple random type without replacement. The medical records were identified from the birth registration book of the CO, considering the first birth of the year 2014 as the medical record number 1. Then, the medical records were selected with the corresponding number in the randomized list. After this process, the inclusion and exclusion criteria of the study were applied. The medical records that did not meet the criteria were replaced by the subsequent number recorded in the CO birth book.

Data analysis was performed by means of simple, exploratory statistical analysis and, also, non-parametric test, adopting a significance level of $p \leq 0.05$. The chi-square test was applied in order to verify if there was statistical difference between the variables. The program used was R 3.0.1®.

The ethical aspects are in accordance with Resolution 466/12, of the National Health Council. In addition, the project was submitted to the Research Ethics Committee, through the Brazil Platform, and approved under the CAAE number: 42934114.3.0000.0118.

RESULTS

The study was carried out with 137 women, with a minimum age of 18 years and a maximum of 45 years. The median age was 27 years. It was observed that of the total number of pregnant women (137), most of them attended high school (55.4%) and were in paid employment (60.5%). Regarding obstetric data, it was noted that 53.2% were nulliparous, 81% had six or more prenatal consultations. In addition, the majority of the participants were of gestational age equal to or greater than 41 weeks at the time of admission (Table 1). All participants performed at least one ultrasonography (USG) during gestation and 74 (54%) performed this test before the 14th week of gestation. There was no statistically significant difference between gestational age (IG) by the date of the last menstruation (DUM) and by the USG.

Table 1 - Sociodemographic and obstetric characteristics of pregnant women, Florianópolis, Santa Catarina, 2015

Caracteristic		n (%)
Age	18 to 35 years of age	123 (87.6)
	> 35 years of age	17 (12.4)
Schooling	Primary School	38 (27.7)
	Secondary School	76 (55.4)
	3rd Level Education	23 (16.7)
Parity	Nulliparous	73 (53.2)
	Primipara	48 (35)
	Multipara	16 (11.6)
Occupation	Student	7 (5.1)
	Housewife	40 (29.1)
	Paid employment	83 (60.5)
	No response	7 (5.1)
Prenatal Consultations	<6 consultations	26 (19)
	≥ 6 consultations	111 (81)
Gestational age (USG)	< 37 weeks	10 (72)
	37 to 40 weeks 6 days	61 (44.5)
	≥ 41 weeks	66 (48.2)
Gestational age (DUM)	<37 weeks	12 (8.7)
	37 to 40 weeks 6 days	47 (34.3)
	≥ 41 weeks	56 (40.8)
	Uncertain	22 (16.1)
Obstetric History	Caesarian Section	23 (16.7)
	Vaginal Delivery	41 (29.9)

In the studied sample, there were no elective inductions, i.e. all were justified by clinical conditions. Regarding the reasons for labor induction: 72 (53%) were performed by post-term pregnancy, 33 (24%) for hypertensive syndromes during gestation, 10 (7.3%) for oligohydramnios, 10 (7.3%) due to Premature Rupture of Membranes (RUPREMA) and 3 (2.1%) due to Restriction of Intrauterine Growth (IUGR). 1 (0.7%) was related to Post-term pregnancy and hypertensive Syndrome during gestation or Post-term pregnancy and Oligohydramnios. The remaining 7 (5.1%) cases were due to other obstetric indications. Regarding the induction methods, all practices used in the studied CO were analyzed. The use of Misoprostol of 25mcg via the vaginal route in 63 (46%) patients, and also the use of Misoprostol of 25mcg prior to the use of Oxytocin in 39 (28.4%) of the inductions was highlighted. Regarding the amount of Misoprostol used, an average of 2.7 Misoprostol was obtained for each pregnant woman, with the minimum being a 25 mcg tablet and a maximum of 8 tablets of the same dosage.

Regarding the outcome of induction, 60 (43.8%) of the analyzed cases evolved to cesarean section and 77 (56.2%) to vaginal delivery. When analyzed, the use of the Foley catheter was used in 70% of caesarean sections and the use of Misoprostol associated with oxytocin were used in 76.9% of normal deliveries (Table 2).

Table 2 - Methods and outcomes of labor induction. Florianópolis, Santa Catarina, 2015

Induction Method	Total n (%)	Vaginal Delivery n (%)	Caesarian Section n(%)
Foley Catheter	10 (7.4)	3 (30)	7 (70)
Misoprostol	63 (46)	36 (57.2)	27 (42.8)
Oxytocin	12 (8.7)	4 (33.4)	8 (66,6)
Foley Catheter + Oxytocin	13 (9.4)	4 (30.7)	9 (69.2)
Misoprostol + Oxytocin	39 (28.4)	30 (76.9)	9 (23.1)

When analyzing the occurrence of normal birth, it is observed that the use of Misoprostol presented a statistically significant outcome in relation to the other methods (Table 3).

Table 3 - Percentage of the use of the induction method according to the outcome of vaginal delivery and Chi-square test value. Florianópolis, Santa Catarina, 2015

Induction Method	n	%	Chi-square		
			x^2	df	p
Oxytocin	64	49.35			
Misoprostol	102	85.71	90.85	5	**<0.01**
Foley Catheter	23	9			

Regarding newborn outcomes, most newborns were born at term and 91.2% had an Apgar score greater than or equal to 7 in the first minute of life. Regarding the destination, 93.5% went back to the maternity ward with the mother (Table 4).

Table 4 - Outcomes of newborns of women submitted to labor induction. Florianópolis, Santa Catarina, 2015

Newborn Outcomes		n (%)
Apgar 1º min	≥ 7	125 (91.2)
Apgar 5º min	≥ 7	134 (97.8)
Capurro	37 to 40 weeks and 6 days	94 (68.6)
	≥ 41 weeks	34 (24.8)
	< 37 weeks	9 (6.5)
Destination	Returned to ward with mother	128 (93.5)
	Neonatal department	9 (6.5)

It was observed that the Capurro test results were concordant with the gestational age by the USG and/or DUM in 65% of the cases. The remaining 35% were divergent and a statistically significant value (Table 5).

Table 5 - Distribution of gestational age calculation methods according to the Capurro and Chi-square test value. Florianópolis, Santa Catarina, 2015

Use of gestational age calculation method	n	%	Chi-square		
			x^2	df	p
Ultrasound	91	66.42	28.28	3	<0.01
Date of last menstruation	90	65.69			

DISCUSSION

Regarding the obstetric profile of the participants, it was verified that most of them were

nulliparous. This data is similar to that found in a systematic review which describes that women who are experiencing the first pregnancy are more subject to induction.[4]

Regarding prenatal care, most of the women performed six or more consultations, according to the recommendations of the Ministry of Health.[8] In addition, it is known that the South and Southeast regions have better prenatal care and coverage of the target population when compared to other places in Brazil.[9]

It is added that more than half of the women studied (54%) underwent USG before 14 weeks of gestation, which allows a precise definition of IG, which is fundamental in the extremes of fetal viability. The distinction between a post-term pregnancy or and a pre-term pregnancy depends on the estimated IG day variation; therefore, the prediction of GI from the measurement of fetal craniocaudal length between the 11th and the 14th week has an error of at most one week.[10]

Although there was no statistical difference between the DUM and the USG in this sample, it is known that when compared to the date of the first day of the last menstrual cycle with first-trimester sonographic parameters, ultrasound allows a significant reduction in the number of labor inductions due to misdiagnosis of Post-term pregnancies.[10]

Although the majority of women had early USG (54%) when comparing the Capurro test of newborn with gestational age calculated by USG and DUM, there was statistical difference, or rather, about 35% of the evaluated Capurro tests had no relation to age (Both by DUM and USG). It should be noted that as it was not possible to evaluate the difference in days or weeks between these variables, the precise interpretation of this data is compromised.

Regarding induction indications, the majority (53%) of the patients were induced due to post-term pregnancy, 24% due to Hypertensive Syndromes of Pregnancy, 7.3% due to oligohydramnios and by RUPREMA and 2.1% IUGR. It should be noted that these findings are similar to those found in other studies.[4-5,7] With regard to post-term pregnancy (≥41 weeks), there is controversy regarding the best obstetric behavior, since the available literature consists of randomized clinical trials comparing induction after 41 weeks *versus* expectant management with monitoring of fetal well-being.[4,6-7]

Regarding the ideal number of weeks for labor induction , the guidelines for obstetrics in Canada and the United Kingdom recommend labor induction for women after 41 weeks, emphasizing that expectant management, with fetal monitoring, may be chosen. Studies indicate that a routine induction policy at 41 weeks' gestation would result in 240 inductions per 1,000 pregnant women compared to 90 per 1,000 at induction at 42 weeks and 4 per 1,000 at 43 weeks. In addition, it is known that only 5% of pregnant women extend beyond 42 weeks and that the perinatal death rate is low (416 inductions to avoid a perinatal death).[4,11-16]

Another important finding related to the number of inductions due to post-term pregnancy, which was different when compared to the gestational age equal to or above 41 weeks, by DUM and USG. This difference may be related to inductions performed before 41 weeks, which is not recommended by current scientific evidence, since they suggest expectant management and evaluation of fetal well-being and labor inductions between 41 and 42 completed weeks, individually evaluating each case together with the pregnant woman.[12-14]

Regarding the induction of hypertensive syndromes of pregnancy, research shows an induction rate of between 19% and 33.8%, data compatible with those found in this study, and when it comes to mild preeclampsia in term pregnancies, there is not enough evidence that compares the induction with expectant management. In severe preeclampsia, induction is strongly indicated, with level of evidence A, since expectant management is related to the increase in neonatal morbidity.[5,15-16]

Regarding labor indication due to oligohydramnios, the gestational risk factors must be evaluated in order to define the best course of action. The diagnosis of premature rupture of the ovary membranes, maternal diseases (hypertensive syndromes, autoimmune diseases, diabetes with vasculopathy, etc.), intrauterine growth restriction, malformations and fetal infections should be ruled out as well as confirming gestational age. There is no routine indication of pregnancy resolution, since this practice increases cesarean rates without reducing admission to the Intensive Care Unit (ICU) or fetal distress. Labor induction is indicated in the presence of fetal distress or in the impossibility of adequate control of fetal vitality, in addition to cases refractory to the attempt of conservative behavior.[17]

Regarding RUPREMA, it is known that 60% of women with early membrane rupture will go into labor within 24 hours. Regarding the labor induction, it is advisable to perform it within 24 hours after the rupture; However, expectant management, with monitoring of maternal temperature

and fetal wellbeing, can be chosen for a period of up to 96 hours.[5,18]

This recommendation is based on increased complications associated with membrane rupture, such as maternal and neonatal infection, cord prolapse, non-reassuring fetal heart rate, resulting in cesarean sections, and low Apgar scores. A systematic review compared the elective labor induction to expectant management (waiting for spontaneous labor to begin) and concluded that no significant difference was observed between groups regarding cesarean section frequency. On the other hand, labor induction significantly reduced the risk of chorioamnionitis or endometritis, in addition to reducing the risk of hospitalization in the neonatal intensive care unit.[5] Regarding IUGR, there is insufficient evidence for best practice; However, it is believed that labor induction reduces perinatal mortality.[5]

Regarding the methods of labor induction, 46% used 25mcg of Misoprostol via the vaginal route 28.4% used 25mcg Misoprostol associated with Oxytocin. In this case, intravaginal Misoprostol is used first; then, after a favorable uterine cervix, the intravenous Oxytocin is started.

Misoprostol is one of the most commonly used medications for labor induction. A systematic review included 70 clinical trials using vaginal Misoprostol to induce labor with a live fetus, and found that this medication was associated with improved cervical ripening. Furthermore, its use significantly reduced the need for Oxytocin use and increased the frequency of vaginal deliveries within the first 24 hours of induction. However, a higher frequency of tachysystole, uterine hyper stimulation with changes in fetal heart rate, were found. The authors conclude that vaginal Misoprostol is more effective than conventional methods for cervical ripening and labor induction.[19]

The current recommended dose of Misoprostol is 25mcg every 4 or 6 hours, although different doses may be used in selected cases. The study shows that if the 25-mcg dose is used every 6 hours, the possibility of alterations in uterine contractility is negligible and the results for both pregnant and newborn infants are largely favorable, which proves the effectiveness and safety of Misoprostol application.[19-20]

In a clinical study on uterine cervix ripening and labor induction, the authors compared Misoprostol to a placebo, with an efficacy of 87.5% with Misoprostol and 21.1% with the placebo.[6]

Regarding the use of oxytocin alone, there was a 66.4% of rate caesarean section. There is also evidence linking the success of induction using oxytocin alone, with parity, gestational age, cervical conditions, rupture of membranes and fetal presentation.[6] It should also be mentioned that the systematic review included 58 clinical trials and 11,129 women, compared the isolated use of intravenous Oxytocin for cervical ripening and labor induction with several other induction methods. It was observed that vaginal delivery did not occur in 54% of cases within the first 24 hours when the expectant management was used, compared to only 8.3% in the intravenous Oxytocin group. However, a significant increase in the frequency of cesarean section was observed in the Oxytocin group. Thus, it is suggested that Oxytocin be used after the use of another method or agent that ripens the uterine cervix, since it would increase the chance of successful labor induction.[21]

Regarding the outcome of labor induction, analyzing the induction method in relation to the outcome of vaginal delivery, it was perceived that it was statistically significant, since Misoprostol was the method used which most resulted in vaginal delivery. A similar result was found in a study which compared the use of Oxytocin with vaginal application of Misoprostol alone. Oxytocin was associated with greater failure to achieve vaginal delivery, and the frequency of vaginal delivery was significantly higher in the Misoprostol group (72.7%) than in the Oxytocin (45.5%) group when the membrane integrity status was not considered. When there is a broken membrane, both interventions are equally effective; thus, they can be recommended as an induction method.[22] Moreover, when compared to the use of 50 mcg of Misoprostol via the vaginal route, given in two doses at 6-hour intervals, with high doses of oxytocin, 6 mug / min, to induce labor, the onset of labor in 80% of patients in the Misoprostol group and 33.3% in the Oxytocin group was observed. No differences were found between groups in relation to other maternal outcomes and perinatal outcomes; However, the risk of chorioamnionitis was lower with Oxytocin.[22] In relation to the lower failure rate, when Misoprostol is compared to the simple application of a Foley catheter and Oxytocin, it was found that vaginal Misoprostol was more effective.[22]

Regarding induction with a Foley catheter (inflated catheter), the results showed a high cesarean rate, a percentage of 70% when used alone and 69.2% when associated with Oxytocin. It is noteworthy that all patients who induced a Foley catheter had obstetric history of previous caesarean sections. The outcome of the induction is reported

in a literature review which shows that, out of the studies analyzed, only one did not show evidence of a change in the risk of cesarean section. In addition, 11 studies compared the catheter to Prostaglandin with a higher risk of cesarean section. The risk of non-occurrence of vaginal delivery in 24 hours was greater with the catheter. Finally, two studies compared the catheter with Oxytocin, showing a lower risk of cesarean section in the catheter group.[6]

An intervention study analyzed the outcomes of induction with the Foley catheter. The results showed a cesarean rate of 77%. This high incidence of cesarean sections may have occurred because of the small sample, the tendency of some on-call obstetricians to perform cesarean sections in women with previous cesarean section, and also because of the presence of hypertensive syndromes, with 6 patients undergoing cesarean section due to hypertensive spikes.[23]

In addition, a randomized study compared the use of the Foley catheter with Misoprostol. The results demonstrates that labor induction using a Foley catheter is slower when compared to misoprostol ($p<0.05$). Still, there were no significant differences in the rate of vaginal delivery between groups. As for the newborns, there was a significant difference, with a higher Apgar mean at the fifth minute when the induction was performed with Foley catheter. The authors concluded that the use of the transcervical Foley catheter is as effective as vaginal misoprostol for induction of labor.[24]

Regarding neonatal outcomes, regardless of the method used for induction (Foley catheter, Misoprostol and Oxytocin), there were favorable results; in the end, 91.2% of newborns presented Apgar greater than or equal to 7 in the first minute, demonstrating the quality of delivery care and, consequently, the favorable conditions of newborn vitality.[25] It should be noted that only 6.5% went to the neonatal ICU and that the majority of these cases were related to prematurity.

CONCLUSION

Although the cesarean rate of this study is still higher than what is recommended by the World Health Organization, the results are consistent with the Brazilian reality and confirm the tendency that labor induction is considered an important strategy in the reduction of high caesarian section rates.

Regarding the methods used for induction, although the best dose and side effect control are not yet well established, the use of Misoprostol, associated with or without Oxytocin, it guaranteed a higher rate of vaginal delivery, and provided good newborn vitality. There is a need for further studies labor induction methods in order to provide more safety and favorable maternal and neonatal outcomes. Some limitations of the study should be considered: the sample studied was limited, and did not allow for accurate assessments and conclusions regarding the best way to induce labor; some information was poorly recorded or not recorded in the medical records, which compromised the analysis of more variables.

Despite the limitations, this study has yielded results that corroborate with other research. In addition, the data were mostly compared with international data, since there are few public studies on labor induction and its outcomes in the Brazilian reality. Therefore, further research is recommended which use other realities and other methods to provide improved obstetric behaviors, which will clearly benefit the maternal-fetal binomial.

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